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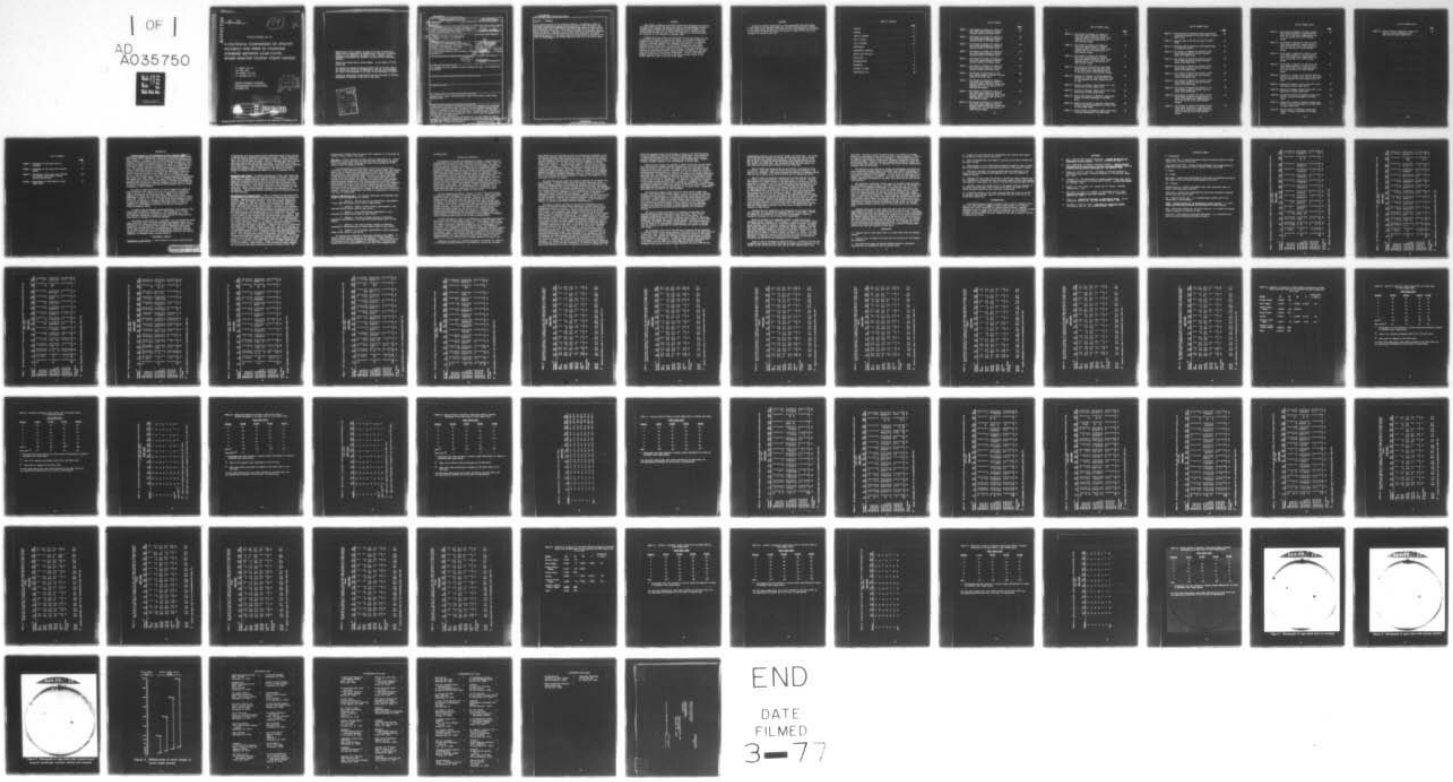

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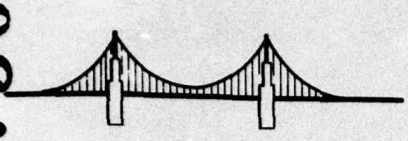

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A STATISTICAL COMPARISON OF ANALYST ACCURACY AND SPEED IN COUNTING STANDARD METHODS AGAR PLATES WITHIN SELECTED COLONY COUNT RANGES

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DEPARTMENT OF NUTRITION
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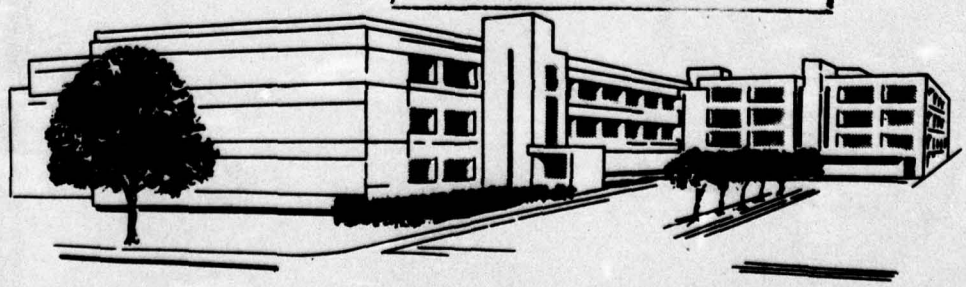

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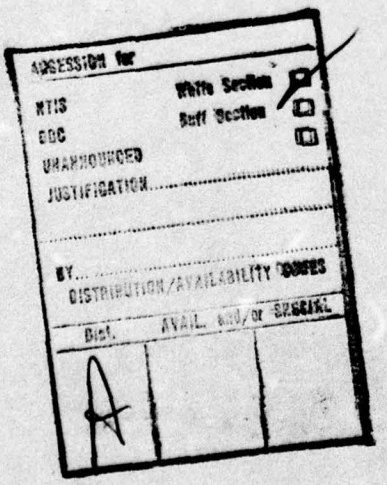

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Agar plates, prepared from serially diluted food homogenate and containing from 30-300 colonies per plate, are used by food microbiology testing laboratories to estimate the microbial population of food samples. Six analysts counted plates with 0-<400 colonies per plate. Analyst accuracy in the 20-200 colonies per plate range was comparable to the 30-300 range and resulted in a 27% reduction in counting time.

A method using agar plates and photographs of the same plates was used to establish the number of colonies per plate. The resulting number was compared

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Block 20 ABSTRACT

to the counts obtained by the individual analysts. In addition, counts of individual analysts were compared to the mean of the counts obtained by the six analysts. In the 30-300 colonies per plate range analysts counted within 5% of the photo count on 60% of the plates and within 5% of the mean count on 68% of the plates. Similarly, in the 20-200 colonies per plate range analysts counted within 5% of the photo and mean count on 60 and 67% of the plates, respectively. On 95% of the plates, analysts counted within 12 and 10% of the photo and mean counts in the 30-300 range and 13 and 11% in the 20-200 range.

ABSTRACT

Agar plates, prepared from serially diluted food homogenate and containing from 30-300 colonies per plate, are used by food microbiology testing laboratories to estimate the microbial population of food samples. Six analysts counted plates with 0-<400 colonies per plate. Analyst accuracy in the 20-200 colonies per plate range was comparable to the 30-300 range and resulted in a 27% reduction in counting time.

A method using agar plates and photographs of the same plates was used to establish the number of colonies per plate. The resulting number was compared to the counts obtained by the individual analysts. In addition, counts of individual analysts were compared to the mean of the counts obtained by the six analysts. In the 30-300 colonies per plate range analysts counted within 5% of the photo count on 60% of the plates and within 5% of the mean count on 68% of the plates. Similarly, in the 20-200 colonies per plate range analysts counted within 5% of the photo and mean count on 60 and 67% of the plates, respectively. On 95% of the plates, analysts counted within 12 and 10% of the photo and mean counts in the 30-300 range and 13 and 11% in the 20-200 range.

FOREWORD

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INTRODUCTION

Standard Methods for the Examination of Dairy Products (SMEDP) (1) states that standard methods agar (SMA) plates containing between 30 and 300 colonies will be counted when estimating the bacterial population of dairy products. In addition, the bacterial population of many other food products is estimated by counting plates with 30-300 colonies (2). The colony count range of 30-300 per plate is the result of a modification of the range of 20-400 originally recommended by Breed and Dotterer (3) in 1916. The original range had the obvious disadvantage of including the counts of more than one serial 1:10 dilution. Breed and Dotterer (3) arrived at the 20-400 range by determining the percentage of plates in various aribtrarily selected count ranges (CR), for example 0-10, 10-20, etc., that deviated by not more than 20% from the calculated mean plate count for a given sample. Then by grouping consecutive count groups, for example 0-30, 5-50, 20-400, etc., they selected the 20-400 colonies per plate range as being the most appropriate. Although the mathematical manipulations utilized were ingenious, comparable to the state of the art of the era, and applicable to the problem being studied, they are totally inadequate by today's methods.

The study by Breed and Dotterer (3) did not address the problem of human reliability with respect to CR nor did it attempt to correlate analyst accuracy with different plate CRs. SMEDP (1) and Courtney (4) suggest the standards for counting colonies on agar plates require individuals to repeat their own counts within 5% and the counts of others within 10%. Fowler et al. (5), in a study specifically designed to test the ability of analysts to reproduce plate counts, found a coefficient of variation for individuals to reproduce their own counts of 8.44% as compared to a coefficient of variation of 20.25% for reproduction of counts performed by others.

In today's food microbiology testing laboratory, large numbers of SMA plate counts are made on a daily basis. The availability of skilled technicians is limited and represents an ever increasing cost. Thus, any laboratory innovation to reduce the time required for technicians to count plates is welcomed by laboratory managers.

The purpose of this study was to determine: (a) the minimum SMA colony count range group (CRG) from which reasonably reproducable counts can be obtained, (b) the counting accuracy of experienced analysts within various colony CRGs, (c) the potential time savings by reducing the SMA colony CRG without increasing the error in estimating the viable cell density, (d) the ideal colony CRG after considering analyst reliability and time required to count plates, and (e) to establish base line data for eventual comparison to automated colony counting machines.

EXPERIMENTAL APPROACH

Preparation of Agar Plates: A stock culture of a locally isolated strain

of *Escherichia coli* which produced small nonspreading opaque white colonies on SMA was grown in quantity in trypticase soy broth. Five ml aliquots of the *E. coli* culture with 10% sterile glycerol added were frozen and held at -18C in 16 x 125 mm screw cap tubes. Prior to preparing agar plates, aliquot tubes were removed from the freezer and thawed. To determine the viable cell population of the aliquot, SMA plates were prepared by serially diluting the *E. coli* culture. Next, dilutions of aliquot tubes were selected to produce SMA plates having 0 to 400 colonies. The plates were poured, allowed to solidify, inverted and placed in a 32 ± 1C incubator for 48 ± 3 h.

Randomizing Agar Plates: To prevent introduction of bias, each analyst was assigned a code letter which was utilized throughout the study. Each plate was assigned a randomly selected number by one of the project coordinators. Except for recognizable dilution patterns of duplicate plates, the only knowledge the analyst had was that the predicted count was between 0 and 400 colonies per plate. Each analyst was given a sheet numbered with the coded plate numbers to record colony counts and the time required to count each plate. Colony counts reported by analysts were compiled by the coordinators. Analysts were neither restricted from nor provided access to the data collected.

Photographing and Counting Plates: Prior to counting, the SMA plates were photographed by the Audio/Visual Aids Division, Letterman Army Institute of Research. Immediately after the photos were taken, the SMA plates were returned to the Food Hygiene Division. Using the procedure suggested in Chapter 5 SMEDP (1), they were counted by six analysts who recorded the colony count, plate number and counting time in seconds for each plate. Counts were made using a Quebec Colony Counter, hand tally, and stopwatch. After all six analysts had completed counting, the plates were stored in a refrigerator at 4C. During the counting period, photographs taken prior to the counting period were processed and 8 x 10 in black and white prints were made available to the Food Hygiene Division within 4 h. Figure 1 shows a photo similar to those received from the Audio/Visual Aids Division. The two project coordinators compared each plate with its corresponding picture and circled each colony in the picture with indelible ink. This resulted in a picture similar to Figure 2. If Figures 1 and 2 are carefully examined, they reveal what appear to be colonies that are unmarked on Figure 2, particularly near the edge of the plate. These are the result of reflections from nearby marked colonies, bubbles in the media, flaws in the plastic, or other artifacts. In addition, some colonies that could not be visualized on the photograph because of size or because colonies were superimposed on one another, were marked by the two coordinators after verifying them against the plate. After verifying each colony on the picture, the two coordinators exchanged photographs and plates and verified the other's work. The circles on the picture were then graphically partitioned with an indelible pen into groups of 5 and counted. The coordinators again exchanged photographs and verified the count for each picture. Figure 3 is a picture after verification and counting. Reverification of this procedure by again comparing the plate and the photograph indicated accuracy in excess of 99%. The

verified count obtained from the picture after comparing it to the plate was called the photo count or true count.

Test Data: A daily tabulation of photo counts was mainained by CR. Adjustments in the plating dilutions were made to assure that each CR, as determined by the photo count, contained the counts from a minimum of 30 SMA plates in each CR between 10 and 300.

At the conclusion of the experiment, the data for each SMA plate, consisting of plate identification, photo count, analyst counts, and counting times of the 6 analysts were transcribed onto coding forms from which cards were keypunched. The keypunched cards were used to create a Statistical Package for the Social Sciences (SPSS) (6) file, by a Control Data Corporation Model 7600 Computer (CDC 7600). SPSS routines were used in all analyses of the data except the analyses of variance which were performed using the methods suggested by Winer (Two-way Analysis of Variance with Repeated Measures on One Factor) (7) and Hollander and Wolfe (8) (Friedman's 2-way Analysis of Variance with Multiple Comparisons Based on Rank Sums). Creation of a mean count (mean count for all six analysts participating in the study) value was accomplished by linking the SPSS file with a Fortran IV program. Statistical significance was based on a probability of 0.95, i.e., a 5% level of significance.

Analyst's Biographical Data: The relevant educational and experience background of the six analysts are as follows:

a. Analyst A - DVM and PhD in food microbiology, approximately 4 years experience making colony counts on agar plates;

b. Analyst B - Master of Public Health, approximately 1 year experience making colony counts on agar plates;

c. Analyst C - BS in microbiology, approximately 4 years experience in making colony counts on agar plates;

d. Analyst D - one year of formal training in laboratory procedures, approximately 1 year experience making colony counts on agar plates;

e. Analyst E - one year of formal training in laboratory procedures, 2 years experience in making colony counts on agar plates;

f. Analyst F - BS in biology, approximately 1 month experience making colony counts on agar plates.

All analysts were required to familiarize themselves with SMEDP. To insure counting would be uniform by all analysts, a formal session to reinforce plate counting procedures was conducted. A series of trial runs was conducted prior to the beginning of the experiment to acquaint each analyst with the recording sheets and in the use of the stopwatch while

counting plates.

RESULTS AND DISCUSSION

The analysis of the data was undertaken in stages. Verification and reverification of the photo count indicated an accuracy of >99%. Thus, the assumption was made that the photo count was the true count. The photo count was used as a standard to compare with the corresponding counts made by individuals and the mean count. These data are recorded as percent accuracy in Tables 1 through 14 and 24 through 35 (percent accuracy is defined for the purposes of this paper to be analyst count/photo count, mean count/photo count, analyst count/mean count, as applicable, times 100). The vertical axis of these tables are the analyst percent accuracy in increments of the photo or mean count, whichever is applicable. The horizontal axis is expressed in arbitrarily selected colony CRs, thus the body of the table is expressed in the percent of analyst colony counts or the mean count that falls in each percent accuracy increment and CR of the photo count or mean count. For example, in Table 1 going down from CR 40-<60 and across from >92.5 to 95 the figure 11.1 is obtained. This figure means that Analyst A counted 11.1% of the 36 plates with photo counts of 40-<60 with a percent accuracy of >92.5 to 95.

The data presented in Tables 1 through 6 provide a detailed breakdown of analysts' counts compared to the photo count, by CR. These tables show analysts' counts to be erratic in low CRs. Analysts' counts tended to become closer to the photo count and more uniform as the photo count increased. The tables also show that analysts count fewer colonies than are actually on the plate. It is obvious that the counting differences in the CRs 0-<5 and 5-<10 are excessive and thus these CRs were deleted from further analysis. The CR over 400 contained only 6 plates and was also deleted from further analysis. The use of the 2.5 percent accuracy increment provides specific detail but results in a cumbersome table. Despite being cumbersome, the data are presented to provide a basis for future analysis of the ability of an analyst to count compared to automated colony counting machines and for use in future investigations.

The data presented in Table 7, the difference of the mean count from the photo count, show the mean count to have a much more central tendency than the counts of any of the individual analysts. It also appears that the mean of a number of analysts, although slightly low, is a good estimate of the true count. This observation will be addressed later. The individual analyst's counts compared to the photo count are displayed in Tables 8 through 13, using the percent accuracy increment of 5. In addition, the percentage of analysts' counts in the percent accuracy increments of 95 to 105 and 90 to 110 are highlighted. These tables show wide variation in counting accuracy between analysts. The data presented in Table 14 are similar to that in Tables 8 to 13 except the mean count is being compared to the photo count.

Analysis of variance with repeated measures on one factor (7), Table 15, of the percent absolute difference of the analysts' counts from the photo

count showed that the calculated F value was significantly different at the 5% level for analysts, CRs, and analysts x CRs. The Tukey Honestly Significant Differences (Tukey HSD) multiple range test (6) applied to the percent absolute difference from the photo count identified subsets of analysts that differed significantly. The mean percent absolute difference by analyst subset were: subset 1 - E=4.2%, A=4.4%, subset 2 - F=5.4%, C=5.5%, subset 3 - B=7.2%, and subset 4 - D=8.7%. These data are average percent absolute difference and are inversely related to accuracy. Because they are a mean percent absolute difference, they cannot be used to compare to the standards suggested by SMEDP (1) and Courtney (4). They are not as precise a measurement of accuracy as confidence statements such as: Analyst X counts within 5% of the true count for Y% of the plates, or Analyst X is within Y% of the true count on 95% of the plates.

The Tukey HSD multiple range test failed to identify the CR subsets that were different. In such instances where the multiple range test fails to identify different subsets, the conventional approach is to declare the two extremes as different which would be the 10-<20 and 60-<80 CRs. Observation of the data shows that the greatest difference was in the 10-<20 CR. Differences were reduced somewhat in the 20-<30 CR but increased in the 30-<40 CR. There was a reduction in the differences in the 40-<60 CR and in the higher CRs counting was fairly uniform with one exception. Analyst F, Table 13, differences increased on plates with over 80 colonies in the 95 to 105 percent accuracy increment. However, the increased differences were not nearly so apparent in the 90 to 110 percent accuracy increment. A large portion of Analyst F's increased differences was due to undercounting.

The number of plates occurring in each CR was influenced by the coordinator who selected dilution factors designed to provide plates with a predetermined number of colonies. Thus the counts were not what one would normally see in a food microbiology testing laboratory where no dilution bias existed. When comparing counts ranging from 10-400, produced from samples that have undergone decimal dilution, it was logical to select ranges that represent 1 logarithm to the base 10. For example, each of the count range groups (CRGs) 10-100, 20-200, 30-300 and 40-400 represented 1 logarithm. The term CRG is used to include 1 logarithm grouping as opposed to the term count range (CR) which is a much smaller and arbitrary grouping of counts. Consequently, the CR of 40-<60, which is included in all four CRGs makes up a different proportion of each CRG. In the 10-100 CRG, 40-<60 represents 22% of the total but only 5.5% of the total in the 40-400 CRG. Thus the percentage of a CR in one CRG can represent a sizable discrepancy when compared to another CRG. To compare the different CRGs, an adjustment for this discrepancy must be made. The discrepancy can be compensated for by obtaining the mantissa of the common logarithm of the extremes of each CR. For example, the values obtained for the CRs 10-<20=0.301, 20-<30=0.175, and 30-<40=0.125. The resulting mantissa was multiplied by the percent of the counts the analyst made in each CR for the selected percent accuracy increment. For example, in Table 8 in the 95-105 percent accuracy increment, the percentages in the CRs were 10-<20=38.6%, 20-<30=60.0%, and 30-<40=53.8%. Thus 0.301 x 38.6%=11.6%, 0.175 x 60.0%=10.5%, and 0.125 x 53.8%=6.72%. The

sum of the mantissas times the percentage of plates in the selected percent accuracy increment for each CR in the CRG was calculated. This resulted in a realistically weighted overall percent of analyst counts in the percent accuracy increment and was used in comparing the different CRGs. Figure 4 presents a graphic display of the relationships of CRs and CRGs.

Tables 16 and 17 depict the percent of analyst counts and the mean counts that fall within the percent accuracy increments of 95 to 105 and 90 to 110 based on the photo count by CRG. For example, Table 16 states that Analyst E was within the percent accuracy increment of 95 to 105 (adjusted to reflect normally occurring proportions of counts in each CR) for 77% of the plates in the 30-300 CRG. Friedman's 2-way analysis of variance with multiple comparisons based upon rank sums (Friedman's Test) (8) was applied to the population means. It showed that the 10-100 CRG was different than the other three CRGs in both tables at the 5% level of significance. It showed no significant differences in the 20-200, 30-300 and 40-400 CRGs. In Table 17, Friedman's Test showed a significant difference between the 20-200 and the 40-400 CRGs. No significant differences appeared in either table between the 20-200 and 30-300 CRGs. However, when comparing the accuracy of the mean count to the photo count, a progressive improvement was observed as the CRGs increased.

The differences among analysts should be noted; Table 16 shows some analysts count nearly twice as many plates in the 95 to 105 percent accuracy increment as other analysts. It is clearly apparent from Table 16 that it is unrealistic to expect analysts to consistently count plates within 5% of the true count. However, Table 17 provides evidence that the motivated analyst can be expected to routinely count plates within 10% of the true count. Although the psychological aspects of plate counting were not addressed, throughout the course of the study it became apparent to observers that personal motivations and attitude played an important role in analyst accuracy.

The report of Breed and Dotterer (3) presented accuracy data that established analyst mean count data as the true count. Their CRs were adjusted arithmetically to compare to those used in this study. By weighting Breed and Dotterer's data to produce typical CRGs, the following percent of total counts fell in the percent accuracy increment of 80 to 120: 10-100=68%, 20-200=80%, 30-300=81%, and 40-400=83%. Even though these data were not based on the same method of establishing a true count, it appears that the accuracy in and above the 20-200 CRG does not improve as the CRG gets larger.

The confidence levels for 95 and 90% were calculated and are expressed as follows: for 95% of the plates, Analyst Y was within X% of the photo count for a given CR or CRG. Tables 18 through 21 contain data relative to the confidence levels of 95 and 90% with the data in Tables 18 and 20 used to develop Tables 19 and 21, respectively. In Table 18 under the 80-<100 CR and across from Analyst C is the number 11. This means that Analyst C was within 11% of the photo count for 95% of the counts made in the CR of 80-<100. Friedman's Test applied to Table 19 again indicated that the 10-100 CRG was

significantly different than the 20-200, 30-300, and 40-400 CRGs. The 20-200 and 30-300 CRGs were similar as were the 30-300 and 40-400, but the 20-200 and the 40-400 were significantly different. The same test applied to the data in Table 21 showed the 10-100 CRG significantly different from the 20-200, 30-300, and 40-400 CRGs. The 20-200 and 30-300 CRGs were similar but both CRGs were significantly different from the 40-400 CRG.

Table 22 shows the counting time for each analyst in seconds per plate for each CR. Going down under the 40-<60 CR and across from Analyst F, the value 25.1 is obtained. This value indicates that Analyst F's average counting time for the 36 plates in the 40-<60 photo CR was 25.1 seconds per plate.

Table 23 shows the projected counting time for CRGs adjusted to reflect the normally occurring proportion of microbial counts in each CR. The data were adjusted in a manner similar to the adjustments of the data in Table 16. Going down, in Table 23, from the 30-300 CRG, and across from Analyst A, the number 44 is obtained. Thus the number 44 indicates that Analyst A had an adjusted average counting time of 44 seconds per plate in the 30-300 CRG. In comparing analysts' counting times per CRG (Table 23) and the accuracy per CRG (Tables 16,17,19,21,37,38,39, and 42) one finds that analyst speed and accuracy has little, if anything, in common. For example, Analyst A required more time to count that the mean of all analysts but was also more accurate than the mean, whereas the opposite was true for Analyst C. Analyst E was both fast and accurate while Analyst B was below the mean for both accuracy and speed. Table 23 also shows the mean reduction in counting time to be 27% when counting in the 20-200 CRG rather than the 30-300 CRG. By using Friedman's Test on the data in Table 23, it was demonstrated that all CRGs were significantly different from each other in regard to the time required to count plates.

Analyses were also conducted on the assumption that the mean count was the true count for the purpose of comparing analyst to mean count. Tables 24 through 29, 30 through 35, and 36 through 42 correspond to Tables 1 through 6, 8 through 13, and 15 through 21, respectively.

Tables 24 through 35 are remarkably similar to their photo count parallels, Tables 1 through 6 and 8 through 13. Analysis of Variance, Table 36, identified the differences in the percent absolute difference of analyst count from mean count in analysts, ranges, and analyst x ranges. The Tukey HSD multiple range test applied to the percent absolute difference from the mean count identified subsets of analysts that differed significantly. The mean percent absolute difference by analyst subset were: subset 1 - E=3.6%, A=3.6%, F=4.1%, subset 2 - C=5.2%, B=5.5%, and subset 3 - D=6.6%. The Tukey HSD multiple range test failed to identify the count range subsets that were different. By applying the convention previously stated, the extremes for the CRs 10-<20 and 60-<80 were considered to be different.

Tables 37 and 38 correspond to Tables 16 and 17. In Tables 37 and 38, the Friedman's Test showed that the 10-100 CRG was significantly different from the 20-200, 30-300, and 40-400 CRGs, which did not differ significantly from

each other. The data in Table 38 indicate that it is realistic to expect analysts to count plates within 10% of the mean of several analysts. Tables 39 through 42 correspond to Tables 18 through 21. The Friedman's Test of the data in Table 40 showed a significant difference between the 10-100 CRG and the other CRGs. Table 42 also had a significant difference between the 10-100 CRG and the other CRGs. In addition, the 20-200 CRG was significantly different from the 40-400 CRG.

The expense and time required to produce the photographs from which the photo counts were obtained cannot be justified under normal circumstances in a food microbiology testing laboratory. Thus, some sort of average colony count must be utilized as the standard. In this study, the mean count of six analysts was evaluated as a standard. This mean count was also compared by several statistical procedures to the photo count which was the most precise count possible.

The regression coefficient of mean counts on the photo count was 0.976 for all plates with photo counts of >10-<400. The t-test (6) was applied to determine if the regression coefficient of 0.976 was the same as 1. The hypothesis was rejected at the 5% level of significance. The means of the photo count and mean count were 116.03 and 113.11, respectively. A paired t-test to compare the means of the mean count and the photo count showed them to be significantly different. The correlation coefficient of the mean count on photo count was 0.998. Thus these tests and coefficients show that: (a) the photo count differed from the mean count, (b) the mean count was a measurably consistent, but a low estimate of the photo count over the entire range and was a practical means of estimating colony counts, (c) the mean count deviates slightly from the photo or true count and is also slightly lower.

Analysts taking part in this study were aware that their counts were being compared to counts of other analyts and to the photo count. This knowledge probably made them more careful than if they were in a food microbiology testing laboratory where the monitoring of analysts is not done on each plate. The maximum counting time for all plates on any given day did not exceed 45 min, which minimized fatigue as an error factor in this study. The colonies were from a pure culture, they were uniform, and the plates did not contain any food particles to be confused with colonies. It is assumed that in an actual food microbiology testing laboratory, the accuracy of colony counts would be less than that reported in this study.

CONCLUSIONS

1. Analysts tend to count fewer colonies on agar plates than are actually present.

2. Analyst counts of plates with fewer than ten colonies are very erratic and inaccurate.

3. The mean of the counts of several analysts provided a measurably consistent but low estimate of the true colony count.

4. Counts over the 10-100 CRG are considerably less accurate than counts in the CRGs of 20-200, 30-300, and 40-400.

5. There is insignificant improvement in accuracy in the CRG of 30-300 over the CRG of 20-200.

6. There appears to be no relationship between the length of time an individual analyst needs to count plates and the accuracy of the analyst's counts.

7. Motivation, attitude, and counting habits were not addressed in this study; as food microbiology testing managers know, these are elements in counting accuracy.

8. Reducing the count range from 30-300 to 20-200 will reduce counting time 27%. Reduction in counting time will both reduce analyst fatigue when analysts are required to count plates for several hours and also improve analyst morale.

9. Analysts' counts fell within the 95 to 105 percent accuracy increment of the photo counts and mean counts on only 60 and 68% of the plates in the 30-300 CRG and 60 and 67% on the 20-200 CRG, respectively.

10. Ninety-five percent of the counts analysts made were within 12 and 10% of the photo count and mean counts in the 30-300 CRG and 13 and 11% in the 20-200 CRG, respectively.

RECOMMENDATIONS

Food microbiological testing laboratory quality control managers responsible for large numbers of SMEDP (1) plate counts should - (a) routinely monitor plate count procedures, (b) randomly sample analysts' counting precision by use of a count established as being true, (c) periodically conduct refresher classes in SMEDP plate counting procedures, and (d) carefully evaluate any procedural or equipment change that may affect analysts' ability to perform plate counts.

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GLOSSARY OF TERMS

C - Centrigrade

Count Range (CR) - A narrow arbitrarily selected sequential group of colony counts, i.e., 10-<20, 20-<30, etc.

Count Range Group (CRG) - Several Pooled sequential count ranges making up ranges with colony counts of 10-100, 20-200, 30-300, and 40-400.

h - Hours

in - Inches

Mean Count - Colony count established for each plate by obtaining the mean of the counts of the six analysts participating in the study.

min - Minutes

Percent Accuracy - Analyst count/photo count, mean count/photo count, or analyst count/mean count times 100.

Photo Count - Colony count established for each plate obtained by counting verified colonies from a photo.

SMA - Standard Methods Agar - is a bacteriological medium used in the enumeration of microorganisms.

SMEDP - Standard Methods for the Examination of Dairy Products - is a book suggesting laboratory procedures for the analysis of dairy products.

SPSS - Statistical Package for the Social Sciences - is a system of prepared computer programs for analysis of data.

Tukey HSD - Tukey Honestly Significant Difference - is a statistical test used to determine differences between treatments.

TABLE 1: The Percent of Analyst A's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	27.3	2.1	6.9	2.5	0	2.8	0	0	0	0	0	0	0	0	0	2.5
>80-82.5	0	0	2.0	3.7	0	0	0	0	0	0	0	0	0	0	0	.7
>82.5-85	0	8.5	3.0	1.2	1.9	0	0	0	0	0	0	0	0	0	0	1.3
>85-87.5	0	12.8	3.0	6.3	0	2.8	2.9	0	0	0	0	0	0	0	0	2.4
>87.5-90	0	6.4	13.9	7.5	3.8	0	2.9	0	0	0	0	0	0	0	0	3.9
>90-92.5	0	0	10.9	10.0	15.4	0	5.9	6.1	0	1.9	4.3	3.0	0	0	0	5.5
>92.5-95	0	0	11.9	3.7	21.2	11.1	11.8	14.3	8.3	5.8	7.2	3.0	7.5	7.5	0	8.5
>95-97.5	0	0	0	26.2	19.2	16.7	26.5	16.3	13.9	19.2	18.8	12.1	22.5	15.4	0	14.5
>97.5-100	54.5	59.6	38.6	27.5	23.1	50.0	29.4	32.7	47.2	26.9	33.3	24.2	22.5	46.2	83.3	35.7
>100-102.5	0	0	0	0	0	13.9	8.8	16.3	16.7	23.1	20.3	21.2	25.0	15.4	0	10.0
>102.5-105	0	0	0	6.3	11.5	2.8	8.8	6.1	11.1	17.3	10.1	24.2	15.0	7.7	16.7	8.1
>105-107.5	0	0	3.0	0	3.8	0	0	4.1	0	5.8	4.3	6.1	5.0	7.7	0	2.7
>107.5-110	0	0	4.0	1.2	0	0	2.9	0	2.8	0	1.4	6.1	0	0	0	1.5
>110-112.5	0	2.1	0	0	0	0	0	4.1	0	0	0	0	0	0	0	.4
>112.5-115	0	2.1	0	1.2	0	0	0	0	0	0	0	0	2.5	0	0	.4
>115-117.5	0	2.1	1.0	0	0	0	0	0	0	0	0	0	0	0	0	.3
>117.5-120	0	2.1	1.0	0	0	0	0	0	0	0	0	0	0	0	0	.3
>120	18.2	2.1	1.0	2.5	0	0	0	0	0	0	0	0	0	0	0	1.2
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	40	13	6	670

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 2: The Percent of Analyst B's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent [1] Accuracy	COUNT RANGE 0- <5	5- <10	10- <20	20- <30	30- <40	40- <60	60- <80	80- <100	100- <150	150- <200	200- <250	250- <300	300- <350	350- <400	Over 400	Row Total
<80	31.8	8.5	18.8	2.5	9.6	2.8	0	0	0	0	0	0	0	0	0	2.2
>80-82.5	0	0	2.0	0	1.9	0	0	2.0	0	0	0	0	0	0	0	.6
>82.5-85	0	8.5	5.9	3.7	1.9	0	0	0	2.8	0	0	0	0	0	0	2.2
>85-87.5	0	12.8	4.0	6.3	3.8	2.8	5.9	4.1	2.8	1.9	1.4	0	0	0	0	3.7
>87.5-90	0	4.3	9.9	5.0	3.8	11.1	5.9	8.2	8.3	7.7	1.4	0	0	0	0	5.4
>90-92.5	0	0	5.0	11.2	3.8	8.3	5.9	14.3	16.7	5.8	8.7	9.1	2.5	7.7	0	7.2
>92.5-95	0	0	11.9	8.8	28.8	19.4	17.6	22.4	13.9	19.2	13.0	30.3	27.5	23.1	0	15.8
>95-97.5	0	0	0	20.0	17.3	19.4	14.7	10.2	2.8	21.2	23.2	9.1	10.0	7.7	0	11.6
>97.5-100	36.4	48.9	27.7	26.2	9.6	11.1	17.6	18.4	13.9	11.5	13.0	6.1	20.0	15.4	66.7	20.9
>100-102.5	0	0	0	0	0	11.1	5.9	8.2	5.6	5.8	10.1	9.1	15.0	7.7	16.7	4.9
>102.5-105	0	0	0	10.0	5.8	8.3	20.6	6.1	8.3	1.9	2.9	9.1	5.0	7.7	0	5.4
>105-107.5	0	0	4.0	0	7.7	2.8	2.9	4.1	11.1	9.6	5.8	9.1	0	7.7	0	4.3
>107.5-110	0	0	5.0	1.2	1.9	2.8	2.9	0	2.8	7.7	10.1	12.1	7.5	0	0	4.2
>110-112.5	0	2.1	0	0	1.9	0	0	0	5.6	3.8	5.8	6.1	5.0	0	0	2.1
>112.5-115	0	4.3	0	0	1.9	0	0	0	2.8	3.8	1.4	0	0	15.4	0	1.3
>115-117.5	0	2.1	4.0	2.5	0	0	0	0	0	0	0	0	7.5	0	0	1.5
>117.5-120	0	0	0	0	0	0	0	2.0	0	0	0	0	0	0	16.7	.3
>120	31.8	8.5	2.0	2.5	0	0	0	0	2.8	0	2.9	0	0	7.7	0	2.8
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	40	13	6	670

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 3: The Percent of Analyst C's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	18.2	6.4	6.9	0	0	0	0	0	2.8	0	0	0	0	0	0	2.2
>80-82.5	0	0	1.0	2.5	0	0	0	0	0	0	0	0	0	0	0	.4
>82.5-85	0	4.3	2.0	1.2	1.9	0	0	0	0	0	0	0	0	0	0	.9
>85-87.5	0	8.5	1.0	7.5	0	0	0	0	0	1.9	0	0	0	0	0	1.8
>87.5-90	0	4.3	9.9	3.7	5.8	2.8	0	2.0	0	1.9	4.3	3.0	0	0	0	3.7
>90-92.5	0	0	7.9	3.7	5.8	5.6	2.9	4.1	11.1	1.9	1.4	12.1	7.5	7.7	16.7	5.1
>92.5-95	0	0	9.9	6.3	7.7	11.1	2.9	14.3	2.8	15.4	10.1	9.1	22.5	23.1	0	9.3
>95-97.5	0	0	0	21.2	13.5	5.6	5.9	16.3	8.3	13.5	24.6	27.3	27.5	15.4	16.7	12.8
>97.5-100	59.1	46.8	35.6	31.3	9.6	27.8	23.5	8.2	19.4	21.2	31.9	21.2	30.0	7.7	66.7	27.9
>100-102.5	0	0	0	0	0	8.3	17.6	18.4	11.1	19.2	10.1	9.1	7.5	15.4	0	7.0
>102.5-105	0	0	0	15.0	26.9	19.4	26.5	18.4	8.3	7.7	11.6	12.1	0	15.4	0	10.7
>105-107.5	0	0	8.9	1.2	7.7	5.6	2.9	8.2	25.0	5.8	4.3	6.1	2.5	7.7	0	6.0
>107.5-110	0	0	5.0	3.7	7.7	5.6	8.8	4.1	8.3	7.7	1.4	0	2.5	7.7	0	4.3
>110-112.5	0	8.5	2.0	0	5.8	2.8	2.9	6.1	0	0	0	0	0	0	0	2.1
>112.5-115	0	0	2.0	0	3.8	0	5.9	0	0	1.9	0	0	0	0	0	1.0
>115-117.5	0	8.5	4.0	0	1.9	0	0	0	0	1.9	0	0	0	0	0	1.5
>117.5-120	0	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	.1
>120	22.7	12.8	3.0	2.5	1.9	5.6	0	0	2.8	0	0	0	0	0	0	3.0
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	40	13	6	670

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 4: The Percent of Analyst D's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	27.3	14.9	16.8	10.0	11.5	5.6	0	0	2.8	0	8.7	0	0	7.7	0	8.1
>80-82.5	0	0	5.0	5.0	5.8	8.3	2.9	2.0	0	1.9	5.8	0	5.9	0	0	3.6
>82.5-85	0	17.0	5.9	3.7	3.8	5.6	2.9	4.1	5.6	3.8	1.4	3.0	5.0	7.7	0	4.9
>85-87.5	0	12.8	7.9	8.8	7.7	8.3	2.9	6.1	5.6	1.9	2.9	3.0	6.5	15.4	0	6.4
>87.5-90	0	6.4	9.9	8.8	15.4	11.1	5.9	6.1	2.8	5.8	5.8	3.0	12.5	7.7	0	7.8
>90-92.5	0	0	10.9	7.5	15.4	11.1	2.9	12.2	5.6	0	10.1	6.1	7.5	7.6	16.7	7.8
>92.5-95	0	0	8.9	3.7	7.7	13.9	14.7	12.2	11.1	9.6	8.7	3.0	7.5	15.4	0	7.9
>95-97.5	0	0	0	20.0	11.5	5.6	14.7	12.2	5.6	5.8	7.2	27.3	10.0	7.7	0	8.8
>97.5-100	63.6	31.9	16.8	15.0	3.8	8.3	8.8	14.3	19.4	13.5	14.5	12.1	20.0	7.7	66.7	17.0
>100-102.5	0	0	0	0	0	8.3	0	8.2	8.3	15.4	5.8	24.2	5.0	7.7	0	4.9
>102.5-105	0	0	0	6.3	9.6	5.6	14.7	6.1	8.3	21.2	10.1	9.1	10.0	15.4	16.7	7.6
>105-107.5	0	0	3.0	1.2	5.8	2.8	17.6	8.2	8.3	5.8	8.7	6.1	10.0	0	0	5.4
>107.5-110	0	0	6.9	5.0	0	2.8	5.9	2.0	5.6	5.8	5.8	0	0	0	0	3.6
>110-112.5	0	4.3	1.0	2.5	0	0	2.9	2.0	2.8	5.8	0	3.0	0	0	0	1.8
>112.5-115	0	6.4	0	1.2	1.9	0	2.9	2.0	2.8	1.9	0	0	0	0	0	1.3
>115-117.5	0	0	5.0	0	0	0	0	0	2.8	1.9	0	0	0	0	0	1.0
>117.5-120	0	0	1.0	0	0	2.8	0	0	2.8	0	0	0	0	0	0	.4
>120	9.1	6.4	1.0	1.2	0	0	0	2.0	0	0	4.3	0	0	0	0	1.6
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	40	13	6	670

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 5: The Percent of Analyst E's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent Accuracy [1]	COUNT RANGE 0- <5	5- <10	10- <20	20- <30	30- <40	40- <60	60- <80	80- <100	100- <150	150- <200	200- <250	250- <300	300- <350	350- <400	Over 400	Row Total
<80	13.6	4.3	1.0	0	1.9	0	0	0	0	0	0	0	2.5	0	0	1.2
>80-82.5	0	0	1.0	0	0	2.8	0	0	0	0	0	0	0	0	0	.3
>82.5-85	0	8.5	4.0	0	3.8	0	0	0	0	0	0	0	0	0	0	1.5
>85-87.5	0	4.3	5.0	5.0	1.9	0	0	0	0	0	0	0	2.5	0	0	1.9
>87.5-90	0	4.3	9.9	0	3.8	5.6	0	0	0	0	2.9	0	0	0	0	2.7
>90-92.5	0	0	10.9	5.0	9.6	5.6	2.9	8.2	0	1.9	5.8	6.1	10.0	15.4	16.7	6.1
>92.5-95	0	0	10.9	7.5	5.8	5.6	8.8	16.3	8.3	13.5	15.9	18.2	22.5	7.7	0	10.4
>95-97.5	0	0	0	26.2	19.2	13.9	20.6	22.4	25.0	30.8	26.1	36.4	22.5	23.1	0	18.1
>97.5-100	77.3	59.6	35.6	35.0	23.1	30.6	41.2	36.7	33.3	36.5	34.8	33.3	20.0	23.1	66.7	36.6
>100-102.5	0	0	0	0	0	19.4	14.7	8.2	11.1	7.7	7.2	0	10.0	15.4	0	5.2
>102.5-105	0	0	0	16.2	21.2	11.1	8.8	6.1	13.9	9.6	5.8	3.0	10.0	7.7	0	8.1
>105-107.5	0	0	9.9	1.2	1.9	5.6	2.9	0	2.8	0	0	3.0	0	7.7	16.7	2.8
>107.5-110	0	0	6.9	0	5.8	0	0	2.0	2.8	0	1.4	0	0	0	0	1.9
>110-112.5	0	10.6	2.0	1.2	0	0	0	0	0	0	0	0	0	0	0	1.2
>112.5-115	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	.1
>115-117.5	0	4.3	0	1.2	0	0	0	0	2.8	0	0	0	0	0	0	.6
>117.5-120	0	2.1	2.0	0	0	0	0	0	0	0	0	0	0	0	0	.4
>120	9.1	0	1.0	1.2	1.9	0	0	0	0	0	0	0	0	0	0	.7
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	49	13	6	670

[1] Analyst count/photo count of the corresponding plates times 100.

TABLE 6: The Percent of Analyst F's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	22.7	2.1	2.0	2.5	3.8	0	0	0	2.8	0	2.9	0	2.5	0	0	2.4
>80-82.5	0	0	0	0	0	0	0	0	2.8	0	0	0	0	0	0	.1
>82.5-85	0	6.4	4.0	0	0	2.8	0	0	0	0	2.9	0	0	0	0	1.5
>85-87.5	0	6.4	4.0	2.5	11.5	2.8	0	0	0	3.8	2.9	6.1	2.5	0	0	3.4
>87.5-90	0	6.4	9.9	3.7	5.8	2.8	0	2.0	2.8	5.8	7.2	6.1	2.5	15.4	16.7	5.4
>90-92.5	0	0	7.9	7.5	5.8	8.3	8.3	12.2	5.6	11.5	18.8	24.2	37.5	15.4	0	11.2
>92.5-95	0	0	8.9	11.2	13.5	11.1	14.7	12.2	11.1	21.2	18.8	27.3	17.5	23.1	0	13.0
>95-97.5	0	0	0	30.0	17.3	19.4	47.1	22.4	38.9	25.0	26.1	9.1	27.5	23.1	0	19.3
>97.5-100	63.6	66.0	52.5	32.5	15.4	30.6	17.6	34.7	22.2	25.0	13.0	12.1	5.0	7.7	66.7	30.9
>100-102.5	0	0	0	0	0	11.1	5.9	12.2	2.8	5.8	1.4	3.0	2.5	7.7	16.7	3.1
>102.5-105	0	0	0	3.7	19.2	8.3	5.9	4.1	5.6	0	4.3	6.1	2.5	0	0	4.2
>105-107.5	0	0	3.0	0	5.8	0	0	0	2.8	0	0	0	0	7.7	0	1.2
>107.5-110	0	0	4.0	1.2	0	2.8	0	0	0	1.9	1.4	6.1	0	0	0	1.5
>110-112.5	0	4.3	0	1.2	0	0	0	0	2.8	0	0	0	0	0	0	.6
>112.5-115	0	0	0	1.2	1.9	0	0	0	0	0	0	0	0	0	0	.3
>115-117.5	0	4.3	2.0	0	0	0	0	0	0	0	0	0	0	0	0	.6
>117.5-120	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	.1
>120	13.6	2.1	2.0	2.5	0	0	0	0	0	0	0	0	0	0	0	1.2
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	40	13	6	670

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 7: The Percent of Mean Counts in each Count Range grouped by Percent Accuracy based on the Photo Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	18.2	2.1	1.0	0	0	0	0	0	0	0	0	0	0	0	0	.9
>80-82.5	0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0	.1
>82.5-85	4.5	2.1	5.0	1.2	0	0	0	0	0	0	0	0	0	0	0	1.2
>85-87.5	0	4.3	4.0	0	1.9	2.8	0	0	0	0	0	0	0	0	0	1.2
>87.5-90	0	4.3	10.9	3.7	9.6	2.8	0	0	2.8	0	1.4	0	2.5	0	0	3.7
>90-92.5	0	6.4	9.9	10.0	7.7	5.6	0	4.1	0	0	2.9	3.0	0	0	0	4.8
>92.5-95	0	6.4	17.8	23.8	15.4	16.7	8.8	8.2	11.1	7.7	14.5	9.1	20.0	7.7	0	13.6
>95-97.5	4.5	12.8	17.8	22.5	15.4	16.7	17.6	36.7	19.4	30.8	29.0	33.3	30.0	53.8	0	23.0
>97.5-100	27.3	31.9	12.9	16.2	36.5	33.3	44.1	32.7	36.1	30.8	36.2	33.3	35.0	30.8	83.3	29.4
>100-102.5	0	2.1	6.9	12.5	5.8	16.7	23.5	14.3	16.7	17.3	10.1	15.2	12.5	0	16.7	11.2
>102.5-105	4.5	12.8	4.0	3.7	5.8	5.6	5.0	2.0	11.1	13.5	4.3	6.1	0	7.7	0	5.8
>105-107.5	4.5	4.3	5.9	1.2	0	0	0	2.0	2.8	0	1.4	0	0	0	0	1.9
>107.5-110	4.5	6.4	3.0	1.2	1.9	0	0	0	0	0	0	0	0	0	0	1.3
>110-112.5	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	.1
>112.5-115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>115-117.5	13.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.4
>117.5-120	0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0	.1
>120	18.2	2.1	1.0	1.2	0	0	0	0	0	0	0	0	0	0	0	1.0
Total Plates in Range	22	47	101	80	52	36	34	49	36	52	69	33	40	13	6	670

[1] Mean count/photo count of the corresponding plate times 100.

TABLE 8: The Percent of Analyst A's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	6.9	2.5	0	2.8	0	0	0	0	0	0	0	0	1.7
>80-85	5.0	5.0	1.9	0	0	0	0	0	0	0	0	0	1.7
>85-90	16.8	3.7	3.8	2.8	5.9	0	0	0	0	0	0	0	5.5
>90-95	22.8	3.7	36.5	11.1	17.8	20.4	8.3	7.7	11.6	6.1	7.5	7.5	15.8
>95-100	38.6	53.7	42.3	66.7	55.9	49.0	61.1	46.2	52.2	36.4	45.0	61.5	47.2
>100-105	0	6.3	11.5	16.7	17.6	22.4	27.8	40.4	30.4	45.5	40.0	23.1	21.9
>105-110	6.9	1.2	3.8	0	2.9	4.1	2.8	5.8	5.8	12.1	5.0	7.7	4.7
>110-115	0	1.2	0	0	0	4.1	0	0	0	0	2.5	0	.7
>115-120	2.0	0	0	0	0	0	0	0	0	0	0	0	.3
>120	1.0	2.5	0	0	0	0	0	0	0	0	0	0	.5
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	40	13	595
>95-105	38.6	60.0	53.8	83.3	73.5	71.4	88.9	86.5	82.6	81.8	85.6	84.6	69.1
>90-110	68.3	64.9	94.1	94.5	94.0	95.9	100.0	100.0	100.0	100.0	97.5	100.0	89.6

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 9: The Percent of Analyst B's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	18.8	2.5	9.6	2.8	0	0	0	0	0	0	0	0	4.5
>80-85	7.9	3.7	3.8	0	0	2.0	2.8	0	0	0	0	0	2.5
>85-90	13.9	11.2	7.7	13.9	11.8	12.2	11.1	9.6	2.9	0	0	0	8.9
>90-95	16.8	20.0	32.7	27.8	23.5	36.7	30.6	25.0	21.7	39.4	30.0	30.8	25.9
>95-100	27.7	46.2	26.9	30.6	32.4	28.6	16.7	32.7	36.2	15.2	30.0	23.1	28.6
>100-105	0	10.0	5.8	19.4	26.5	14.3	13.9	7.7	13.0	18.2	20.0	15.4	13.6
>105-110	8.9	1.2	9.6	5.6	5.9	4.1	3.9	17.3	15.9	21.2	7.5	7.7	9.6
>110-115	0	0	3.8	0	0	0	8.3	7.7	7.2	6.1	5.0	15.4	3.4
>115-120	4.0	2.5	0	0	0	2.0	0	0	0	0	7.5	0	1.7
>120	2.0	2.5	0	0	0	0	2.8	0	2.9	0	0	7.7	1.3
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	40	13	595
>95-105	27.7	57.2	32.7	50.0	58.8	42.9	30.6	40.4	49.3	33.3	50.0	38.5	42.2
>90-110	53.4	77.4	75.0	83.4	88.3	83.7	75.1	82.7	86.8	94.0	87.5	77.0	77.7

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 10: The Percent of Analyst C's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	6.9	0	0	0	0	0	2.3	0	0	0	0	0	1.3
>80-85	3.0	3.7	1.9	0	0	0	0	0	0	0	0	0	1.2
>85-90	10.9	11.2	5.8	2.8	0	2.0	0	3.8	4.3	3.0	0	0	5.2
>90-95	17.8	10.0	13.5	16.7	5.9	18.4	13.9	17.3	11.6	21.2	30.0	30.8	16.0
>95-100	35.6	15.0	26.9	27.8	44.1	36.7	19.4	26.9	21.7	21.2	7.5	30.8	25.6
>100-105	0	52.5	23.1	33.3	29.4	24.5	27.8	34.6	56.5	48.5	57.5	23.1	33.6
>105-110	13.9	5.0	15.4	11.1	11.8	12.2	33.3	13.5	5.8	6.1	5.0	15.4	1.6
>110-115	4.0	0	9.6	2.8	8.8	6.1	0	1.9	0	0	0	0	2.9
>115-120	5.0	0	1.9	0	0	0	0	1.9	0	0	0	0	1.2
>120	3.0	2.5	1.9	5.6	0	0	2.8	0	0	0	0	0	1.5
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	40	13	595
>95-105	35.6	67.5	50.0	61.1	73.5	61.2	47.2	61.5	78.3	69.7	65.0	53.8	59.2
>90-110	67.3	82.5	78.9	88.9	91.2	91.8	94.4	92.3	95.6	97.0	100.0	100.0	86.7

[1] Analyst count/photo count of the corresponding photo times 100.

TABLE 11: The Percent of Analyst D's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent [1] Accuracy	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	16.8	10.0	11.5	5.6	0	0	2.8	0	8.7	0	0	7.7	6.9
>80-85	10.9	8.8	9.6	13.9	5.9	6.1	5.6	5.8	7.2	3.0	10.0	7.7	8.2
>85-90	17.8	17.5	23.1	19.4	8.8	12.2	8.3	7.7	8.7	6.1	20.0	23.1	14.5
>90-95	19.8	11.2	23.1	25.0	17.6	24.8	16.7	9.6	18.8	9.1	15.0	23.1	17.5
>95-100	16.8	35.0	15.4	13.9	23.5	26.5	25.0	19.2	21.7	39.4	30.9	15.4	22.0
>100-105	0	6.3	9.6	13.9	14.7	14.3	16.7	36.5	15.9	33.3	15.0	23.1	15.5
>105-110	9.9	6.3	5.8	5.6	23.5	10.2	13.9	11.5	14.5	6.1	10.0	0	10.1
>110-115	1.0	3.7	1.9	0	5.9	4.1	5.6	7.7	0	3.0	0	0	2.7
>115-120	5.9	0	0	2.8	0	0	5.8	1.9	0	0	0	0	1.7
>120	1.0	1.2	0	0	0	2.0	0	0	4.3	0	0	0	1.0
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	40	13	595
>95-105	16.8	41.3	25.0	27.8	38.2	40.8	41.7	55.8	37.7	72.7	45.0	38.5	37.5
>90-110	46.5	58.8	53.9	58.4	79.3	75.5	72.3	76.8	70.9	87.9	70.0	84.7	65.0

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 12: The Percent of Analyst E's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent [1] Accuracy	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	1.0	0	1.9	0	0	0	0	0	0	0	2.5	0	.5
>80-85	5.0	0	3.8	2.8	0	0	0	0	0	0	0	0	1.3
>85-90	14.9	5.0	5.8	5.6	0	0	0	0	2.9	0	2.5	0	4.5
>90-95	21.8	12.5	15.4	11.1	11.8	24.5	8.3	15.4	21.7	24.2	32.5	23.1	8.5
>95-100	35.6	61.2	42.3	44.4	61.8	59.2	58.3	67.3	60.9	69.7	42.5	56.2	51.7
>100-105	0	16.2	21.2	30.6	23.5	14.3	25.0	17.3	13.0	3.0	20.0	23.1	16.5
>105-110	16.8	1.2	7.7	5.6	2.9	2.0	5.6	0	1.4	3.0	0	7.7	5.2
>110-115	2.0	1.2	0	0	0	0	0	0	0	0	0	0	.5
>115-120	2.0	1.2	0	0	0	0	2.8	0	0	0	0	0	.7
>120	1.0	1.2	1.9	0	0	0	0	0	0	0	0	0	.5
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	40	13	595
>95-105	35.6	77.5	63.5	75.0	85.3	73.5	83.3	84.6	73.9	72.7	62.5	69.2	68.2
>90-110	73.9	91.1	86.6	91.6	100.0	100.0	97.2	100.0	97.1	100.0	95.0	100.0	92.0

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 13: The Percent of Analyst F's Counts in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent [1] Accuracy	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	2.0	2.5	3.8	0	0	0	2.8	0	2.9	0	2.5	0	1.7
>80-85	4.0	0	0	2.8	0	0	2.8	0	2.9	0	0	0	1.3
>85-90	13.9	6.3	17.3	5.6	0	2.0	2.8	9.6	10.1	12.1	5.0	15.4	8.7
>90-95	16.8	18.8	19.2	19.4	23.5	24.5	16.7	32.7	37.7	51.5	55.0	38.5	27.2
>95-100	52.5	62.5	32.7	50.0	64.7	57.1	61.1	50.0	39.1	21.2	32.5	30.8	46.8
>100-105	0	3.7	19.2	19.4	11.8	16.3	8.3	5.8	5.8	9.1	5.0	7.7	9.5
>105-110	6.9	1.2	5.8	2.8	0	0	2.8	1.9	1.4	6.1	0	7.7	3.0
>110-115	0	2.5	1.9	0	0	0	2.8	0	0	0	0	0	.7
>115-120	2.0	0	0	0	0	0	0	0	0	0	0	0	.3
>120	2.0	2.5	0	0	0	0	0	0	0	0	0	0	.7
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	40	13	595
>95-105	52.5	66.2	51.9	69.4	76.5	73.5	69.4	55.8	44.9	30.3	37.5	38.5	56.3
>90-110	79.2	86.2	76.9	91.4	100.0	98.0	88.9	90.4	84.1	87.9	92.5	84.6	86.6

[1] Analyst count/photo count of the corresponding plate times 100.

TABLE 14: The Percent of Mean Count in each Count Range grouped by Percent Accuracy based on the Photo Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	1.0	0	0	0	0	0	0	0	0	0	0	0	.2
>80-85	5.0	2.5	0	0	0	0	0	0	0	0	0	0	1.2
>85-90	14.9	3.7	11.5	5.6	0	0	2.8	0	1.4	0	2.5	0	4.9
>90-95	27.7	33.7	23.1	22.2	8.8	12.2	11.1	7.7	17.4	12.1	20.0	7.7	19.7
>95-100	30.7	38.7	51.9	50.0	61.8	69.4	55.5	61.5	65.2	66.7	65.0	84.6	54.1
>100-105	10.9	16.2	11.5	22.2	29.4	16.3	27.8	30.8	14.5	21.2	12.5	7.7	17.0
>105-110	8.9	2.5	1.9	0	0	2.0	2.8	0	1.4	0	0	0	2.5
>110-115	0	0	0	0	0	0	0	0	0	0	0	0	0
>115-120	0	1.2	0	0	0	0	0	0	0	0	0	0	.2
>120	1.0	1.2	0	0	0	0	0	0	0	0	0	0	.3
Total Plates in Range	101	80	52	36	34	49	36	52	69	33	49	13	595
>95-105	41.6	55.0	63.5	72.2	91.2	85.7	83.3	92.3	79.7	87.9	77.5	92.3	71.1
>90-110	78.2	91.5	88.4	94.4	100.0	100.0	97.2	100.0	98.6	100.0	97.5	100.0	93.2

[1] Mean count/photo count of the corresponding plate times 100.

TABLE 15: Analysis of Variance of Percent Absolute Deviation of Analyst Count from Photo Count for All Analysts and Count Ranges from 10 to <400

Source	SS	df	MS	F	Significant .05
Between Plates	4.02389	594			
Count Ranges	0.64302	11	0.05846	10.080	Yes
Plates w/Count Ranges	3.38088	583	0.005799		
Within Plates	9.92387	2975			
Analyst	0.66932	5	0.13386	43.979	Yes
Analyst x Count Range	0.38169	55	0.00694	2.280	Yes
Analyst x Plate w/Count Ranges	8.87275	2915			
TOTAL	13.94767	3569			

TABLE 16: Percent of Analysts' Counts within 5% of the Photo Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	60	74	78	82
B	43	44	42	44
C	55	60	61	62
D	29	38	40	43
E	63	78	77	77
F	63	66	61	60
Mean 1/	53[a]	60[b]	60[b]	61[b]
Mean Count 2/	62	76	81	84

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

1/ Mean of all analysts percentage within 5% of the photo count.

2/ Mean count as compared to the photo count.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 17: Percent of Analysts' Counts within 10% of the photo Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	83	92	97	97
B	70	77	82	84
C	81	88	91	94
D	58	67	70	73
E	87	95	96	98
F	86	88	88	90
Mean 1/	78[a]	85[b]	88[bc]	89[c]
Mean Count 2/	89	96	97	98

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

1/ Mean of all analysts percentage within 10% of the photo count.

2/ Mean count as compared to the photo count.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 18: Ninety-five Percent of Analysts' Counts were Within a Certain Percentage of the Photo Count

	COUNT RANGE											
Analyst	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400
A	21	19	10	7	8	10	6	6	8	8	6	7
B	30	17	22	12	12	14	14	12	14	10	15	13
C	25	17	14	11	10	11	9	10	10	9	8	8
D	27	24	22	20	15	17	17	15	23	12	17	16
E	17	14	16	10	5	9	7	7	8	6	10	8
F	17	15	13	11	8	8	11	10	17	12	11	11
Mean 1/	23	18	16	12	10	12	11	10	13	10	8	11
Mean Count 2/	15	12	11	7	5	6	5	5	6	6	6	5

1/ Mean of all analysts within percentage for the 95% level.

2/ Mean count within percentage as compared to the photo count at the 95% level.

TABLE 19: Ninety-five Percent of Analysts' Counts were Within a Certain Percentage of the Photo Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	14	10	7	7
B	20	15	14	13
C	17	12	11	10
D	22	19	18	17
E	15	10	9	8
F	16	11	11	11
Mean 1/	17^{a}	13^{b}	12^{bc}	11^{c}
Mean Count 2/	10	7	6	6

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

1/ Mean of all analysts within percentage of the 95% level.

2/ Mean count within percentage as compared to the photo count at the 95% level.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 20: Ninety Percent of Analysts' Counts were Within a Certain Percentage of the Photo Count

	COUNT RANGE											
Analyst	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400
A	18	15	10	7	8	7	5	5	6	7	5	7
B	25	15	18	11	12	12	12	11	10	10	11	13
C	25	14	12	10	10	9	9	8	7	9	7	8
D	21	20	20	18	14	14	16	13	22	10	14	16
E	13	9	12	9	5	8	5	6	7	9	8	8
F	13	12	13	9	7	8	9	10	12	10	9	11
Mean 1/	19	14	14	11	9	10	9	9	11	9	9	11
Mean Count 2/	12	10	10	6	5	5	5	5	5	5	5	5

1/ Mean of all analysts within percentage for the 90% level.

2/ Mean count within percentage as compared to the photo count at the 90% level.

TABLE 21: Ninety Percent of Analysts' Counts were Within a Certain Percentage of the Photo Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	12	8	7	6
B	17	13	12	11
C	14	10	9	8
D	19	17	16	16
E	10	8	8	7
F	11	10	10	9
Mean 1/	14[a]	11[b]	10[b]	10[c]
Mean Count 2/	9	7	6	5

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

1/ Mean of all analysts within percentage for the 90% level.

2/ Mean count within percentage as compared to the photo count at the 90% level.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 22: Counting Time in Seconds per Plate by Count Range

	COUNT RANGE													
Analyst	0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400
A	6.8	7.3	9.2	12.4	17.1	21.8	29.0	35.3	47.3	60.9	76.9	90.7	110.1	124.5
B	6.3	8.6	12.4	18.6	23.8	25.8	32.8	39.0	49.7	61.1	75.6	90.2	109.4	124.7
C	5.5	5.5	7.9	11.0	14.2	16.8	23.9	26.2	35.4	45.8	58.1	65.8	80.0	93.0
D	7.1	6.7	7.6	10.1	13.1	17.9	28.5	30.6	47.2	61.7	74.5	93.0	118.5	130.5
E	7.3	7.5	9.1	11.4	15.1	17.2	23.2	26.9	34.9	45.4	58.3	65.4	78.2	87.9
F	7.7	6.7	9.1	13.0	20.5	25.1	34.2	38.7	53.2	66.7	79.0	88.0	108.1	121.5
Mean	6.8	7.1	9.2	12.8	17.3	20.8	28.6	32.8	44.6	56.9	70.4	82.3	100.7	113.7

TABLE 23: Counting Time By Analyst by Count Range Group in Seconds per Plate*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	18	31	44	56
B	22	35	46	58
C	15	24	33	42
D	16	29	42	56
E	15	24	33	42
F	20	35	48	59
Mean	18[a]	30[b]	41[c]	52[d]

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 24: The Percent of Analyst A's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count

Percent Accuracy [1]	COUNT RANGE 0- <5	5- <10	10- <20	20- <30	30- <40	40- <60	60- <80	80- <100	100- <150	150- <200	200- <250	250- <300	300- <350	350- <400	Over 400	Row Total
<80	25.0	1.5	1.1	0	0	0	0	0	0	0	0	0	0	0	0	1.2
>80-82.5	0	1.5	1.1	0	0	0	0	0	0	0	0	0	0	0	0	.3
>82.5-85	0	1.5	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	.6
>85-87.5	4.2	1.5	2.1	0	2.2	0	0	0	0	0	0	0	0	0	0	.7
>87.5-90	0	6.1	3.2	1.2	2.2	0	0	0	0	0	0	0	0	0	0	1.3
>90-92.5	8.3	9.1	7.4	3.7	0	3.2	5.1	0	2.9	0	0	0	0	0	0	3.3
>92.5-95	0	9.1	8.5	7.5	4.3	9.7	7.7	2.3	0	1.8	2.9	0	0	12.5	0	4.9
>95-97.5	4.2	10.6	13.8	23.8	10.9	6.5	17.9	9.3	8.6	5.6	8.8	2.6	2.8	25.0	0	11.0
>97.5-100	33.3	19.7	19.1	18.8	19.6	35.5	25.6	32.6	25.7	30.9	16.2	7.7	13.9	12.5	83.3	22.2
>100-102.5	0	12.1	9.6	13.7	28.3	22.6	20.5	32.6	37.1	34.5	38.2	35.9	30.6	0	0	22.8
>102.5-105	4.2	7.6	8.5	17.5	15.2	12.9	17.9	11.6	14.3	20.0	14.7	17.9	27.8	50.0	16.7	14.8
>105-107.5	0	7.6	11.7	10.0	10.9	9.7	5.1	7.0	8.6	5.5	11.8	23.1	22.2	0	0	10.1
>107.5-110	0	6.1	2.1	2.5	4.3	0	0	2.3	0	1.8	4.4	7.7	2.8	0	0	2.8
>110-112.5	0	3.0	6.4	0	0	0	0	2.3	0	0	2.9	0	0	0	0	1.6
>112.5-115	0	1.5	0	0	0	0	0	0	2.9	0	0	2.6	0	0	0	.4
>115-117.5	0	1.5	2.1	0	2.2	0	0	0	0	0	0	2.6	0	0	0	.7
>117.5-120	4.2	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	.3
>120	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.6
Total Plates in Range	24	66	94	80	46	31	39	43	35	55	68	39	36	8	6	670

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 25: The Percent of Analyst B's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	25.0	7.6	6.4	1.2	2.2	3.2	0	0	0	0	0	0	0	0	0	3.0
>80-82.5	0	1.5	3.2	0	0	0	0	0	0	0	0	0	0	0	0	.6
>82.5-85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>85-87.5	12.5	3.0	6.4	1.2	4.3	0	0	4.7	2.9	0	0	0	0	0	0	2.5
>87.5-90	0	3.0	2.1	2.5	4.3	0	2.6	0	5.7	1.8	0	0	0	0	0	1.8
>90-92.5	4.2	10.6	8.5	6.3	4.3	9.7	7.7	14.0	5.7	1.8	2.9	0	0	0	0	6.0
>92.5-95	0	13.6	13.8	10.0	6.5	16.1	10.3	16.3	11.4	16.4	4.4	2.6	8.3	0	0	10.3
>95-97.5	0	7.6	10.6	12.5	19.6	19.4	17.9	14.0	14.3	20.0	13.2	15.4	19.4	12.5	0	13.7
>97.5-100	29.2	16.7	6.4	21.2	17.4	19.4	35.9	9.3	14.3	16.4	17.6	25.6	13.9	25.0	66.7	17.9
>100-102.5	0	7.6	8.5	16.2	13.0	6.5	10.3	23.3	17.1	16.4	22.1	12.8	13.9	12.5	0	13.3
>102.5-105	0	7.6	12.8	10.0	10.9	9.7	5.1	9.3	8.6	7.3	13.2	10.3	5.6	12.5	16.7	9.4
>105-107.5	4.2	4.5	9.6	8.8	8.7	6.5	7.7	7.0	2.9	9.1	2.9	12.8	13.9	12.5	0	7.6
>107.5-110	0	3.0	5.3	7.5	4.3	9.7	2.6	0	2.9	1.8	11.8	12.8	5.6	0	0	5.4
>110-112.5	4.2	1.5	3.2	0	0	0	0	0	8.6	7.3	4.4	5.1	2.8	0	0	2.7
>112.5-115	0	1.5	2.1	1.2	2.2	0	0	0	0	1.8	4.4	0	13.9	0	0	2.1
>115-117.5	0	4.5	0	0	2.2	0	0	0	0	0	0	0	0	12.5	0	.7
>117.5-120	0	0	0	0	0	0	0	2.3	5.7	0	0	0	0	0	16.7	.6
>120	20.8	6.1	1.1	1.2	0	0	0	0	0	0	2.9	2.6	2.8	12.5	0	2.4
Total Plates in Range	24	66	94	80	46	31	39	43	35	55	68	39	36	8	6	670

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 26: The Percent of Analyst C's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count

Percent Accuracy [1]	COUNT RANGE 0- <5	5- <10	10- <20	20- <30	30- <40	40- <60	60- <80	80- <100	100- <150	150- <200	200- <250	250- <300	300- <350	350- <400	Over 400	Row Total
<80	2.5	1.5	2.1	0	0	0	0	0	2.9	0	0	0	0	0	0	1.0
>80-82.5	0	1.5	1.1	0	0	0	0	0	0	0	0	0	0	0	0	.3
>82.5-85	0	3.0	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	.7
>85-87.5	8.3	3.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	.7
>87.5-90	0	1.5	1.1	2.5	0	0	0	0	0	0	0	0	0	12.5	0	.7
>90-92.5	4.2	3.0	5.3	5.0	2.2	0	0	0	0	1.8	1.5	2.6	0	0	0	2.4
>92.5-95	4.2	4.5	5.3	2.5	6.5	3.2	5.1	9.3	11.4	3.6	5.9	5.1	11.1	12.5	33.3	6.0
>95-97.5	0	3.0	9.6	11.2	4.3	6.5	2.6	4.7	2.9	7.3	16.2	15.4	13.9	12.5	0	8.2
>97.5-100	29.2	15.2	10.6	16.2	10.9	22.6	7.7	11.6	11.4	27.3	26.5	28.2	30.6	12.5	66.7	18.5
>100-102.5	0	9.1	7.4	12.5	10.9	9.7	20.5	20.9	20.0	27.3	20.6	28.2	22.2	0	0	15.4
>102.5-105	8.3	12.1	14.9	17.5	23.9	16.1	28.2	20.9	20.0	20.0	11.8	7.7	13.9	37.5	0	16.6
>105-107.5	4.2	12.1	9.6	13.7	8.7	19.4	23.1	20.9	14.3	5.5	7.4	5.1	0	0	0	10.7
>107.5-110	0	3.0	9.6	6.3	6.5	12.9	5.1	4.7	8.6	3.6	5.9	2.6	2.8	0	0	5.7
>110-112.5	0	6.1	9.6	5.0	10.9	3.2	5.1	2.3	5.7	1.8	2.9	2.6	2.8	12.5	0	5.1
>112.5-115	0	4.5	3.2	5.0	2.2	0	0	2.3	0	1.8	1.5	2.6	2.8	0	0	2.4
>115-117.5	0	4.5	3.2	0	8.7	0	0	2.3	2.9	0	0	0	0	0	0	1.8
>117.5-120	4.2	3.0	2.1	1.2	0	0	2.6	0	0	0	0	0	0	0	0	1.0
>120	25.0	9.1	2.1	0	4.3	6.5	0	0	0	0	0	0	0	0	0	2.7
Total Plates in Range	24	66	94	80	46	31	39	43	35	55	68	39	36	8	6	670

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 27: The Percent of Analyst D's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	29.2	7.6	3.2	2.5	4.3	6.5	0	0	2.9	0	2.9	0	2.8	0	0	3.7
>80-82.5	0	1.5	4.3	2.5	4.3	0	0	0	0	0	4.4	0	0	0	0	1.8
>82.5-85	0	4.5	6.5	3.7	0	0	2.6	4.7	0	1.8	2.9	2.6	5.6	12.5	0	3.4
>85-87.5	8.3	7.6	1.1	3.7	4.3	3.2	2.6	2.3	8.6	0	4.4	0	0	12.5	0	3.4
>87.5-90	0	6.1	7.4	11.2	15.2	6.5	2.6	4.7	8.6	7.3	1.5	5.1	0	25.0	0	6.6
>90-92.5	8.3	13.6	12.8	7.5	10.9	6.5	5.1	7.0	2.9	3.6	10.3	5.1	2.8	0	16.7	8.2
>92.5-95	0	10.6	9.6	5.0	23.0	19.4	10.3	9.3	8.6	7.3	8.8	17.9	13.9	0	0	10.4
>95-97.5	4.2	6.1	7.4	15.0	4.3	16.1	10.3	11.6	11.4	3.6	8.8	10.3	13.9	25.0	0	9.4
>97.5-100	33.3	16.7	14.9	12.5	8.7	9.7	17.9	7.0	2.9	10.9	2.9	12.8	16.7	0	66.7	12.5
>100-102.5	0	4.5	6.4	11.2	10.9	3.2	15.4	20.9	17.1	16.4	13.2	20.5	22.2	0	0	11.8
>102.5-105	4.2	4.5	5.3	6.3	10.9	16.1	12.8	9.3	8.6	18.2	11.8	17.9	2.8	25.0	16.7	9.7
>105-107.5	4.2	4.5	3.2	8.8	2.2	0	12.8	7.0	5.7	10.9	14.7	2.6	11.1	0	0	6.9
>107.5-110	0	3.0	7.4	6.3	0	3.2	5.1	11.6	11.4	10.9	5.9	5.1	8.3	0	0	6.1
>110-112.5	0	3.0	5.3	1.2	0	6.5	2.6	0	2.9	7.3	1.5	0	0	0	0	2.5
>112.5-115	0	3.0	3.2	1.2	0	0	0	2.3	5.7	0	2.9	0	0	0	0	1.6
>115-117.5	0	0	0	0	3.2	0	0	0	0	0	0	0	0	0	0	.1
>117.5-120	0	0	1.1	0	0	0	0	0	0	0	1.5	0	0	0	0	.3
>120	8.3	3.0	1.1	1.2	0	0	0	2.3	2.9	1.8	1.5	0	0	0	0	1.5
Total Plates in Range	24	66	94	80	46	31	39	43	35	55	68	39	36	8	6	670

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 28: The Percent of Analyst E's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	20.8	3.0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	1.2
>80-82.5	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	.1
>82.5-85	0	1.5	1.1	1.2	2.2	0	0	0	0	0	0	0	0	0	0	.6
>85-87.5	8.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.3
>87.5-90	0	3.0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	.6
>90-92.5	4.2	3.0	2.1	3.7	2.2	3.2	0	0	0	0	0	0	2.8	0	16.7	1.8
>92.5-95	4.2	6.1	8.5	2.5	6.5	6.5	2.6	11.6	0	10.9	2.9	10.3	2.8	0	0	5.8
>95-97.5	4.2	4.5	14.9	6.3	8.7	6.5	12.8	20.9	20.0	14.5	25.0	23.1	13.9	25.0	0	13.6
>97.5-100	29.2	16.7	12.8	20.0	15.2	29.0	33.3	23.3	25.7	36.4	26.5	25.6	41.7	12.5	66.7	24.2
>100-102.5	0	9.1	6.4	22.5	17.4	22.6	30.8	27.9	22.9	23.6	26.5	17.9	27.8	37.5	0	19.1
>102.5-105	8.3	15.2	18.1	17.5	26.1	16.1	12.8	7.0	20.0	9.1	16.2	12.8	8.3	12.5	0	14.9
>105-107.5	0	10.6	14.9	12.5	13.0	9.7	2.6	7.0	2.9	5.5	1.5	2.6	2.8	12.5	16.7	7.9
>107.5-110	0	7.6	7.4	6.3	4.3	3.2	5.1	2.3	5.7	0	0	5.1	0	0	0	4.0
>110-112.5	0	9.1	7.4	3.7	0	0	0	0	2.9	0	1.5	0	0	0	0	2.7
>112.5-115	0	6.1	2.1	2.5	2.2	3.2	0	0	0	0	0	0	0	0	0	1.5
>115-117.5	0	1.5	2.1	1.2	2.2	0	0	0	0	0	0	0	0	0	0	.7
>117.5-120	4.2	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	.3
>120	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.6
Total Plates in Range	24	66	94	80	46	31	39	43	35	55	68	39	36	8	6	670

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 29: The Percent of Analyst F's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count

Percent Accuracy [1]	COUNT RANGE 0-<5	5-<10	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	Over 400	Row Total
<80	20.8	1.5	0	2.5	0	0	0	0	0	0	0	2.6	0	0	0	1.3
>80-82.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>82.5-85	0	1.5	0	0	2.2	0	0	0	5.7	0	1.5	0	0	0	0	.7
>85-87.5	12.5	0	3.2	0	0	0	0	0	0	0	2.9	2.6	0	0	0	1.3
>87.5-90	0	4.5	0	0	4.3	0	0	0	0	3.6	2.9	5.1	2.8	0	16.7	1.9
>90-92.5	8.3	4.5	4.3	2.5	2.2	0	2.6	2.3	2.9	9.1	8.8	5.1	2.8	25.0	0	4.6
>92.5-95	4.2	4.5	6.4	6.3	6.5	6.5	2.6	7.0	8.6	7.3	20.6	23.1	22.2	12.5	0	9.4
>95-97.5	4.2	9.1	8.5	17.5	6.5	19.4	41.0	23.3	22.9	34.5	29.4	17.9	33.3	12.5	0	19.6
>97.5-100	29.2	22.7	18.1	33.7	21.7	25.8	23.1	23.3	45.7	23.6	13.2	25.6	22.2	12.5	66.7	24.5
>100-102.5	0	9.1	12.8	11.2	28.3	25.8	23.1	25.6	8.6	16.4	13.2	7.7	13.9	25.3	0	14.8
>102.5-105	4.2	12.1	20.2	16.2	19.6	18.1	7.7	9.3	2.9	3.8	5.9	2.6	2.8	0	16.7	10.7
>105-107.5	4.2	12.1	9.6	6.3	4.3	3.2	0	7.0	0	0	1.5	7.7	0	12.5	0	5.1
>107.5-110	0	6.1	6.4	1.2	0	0	0	2.3	0	0	0	0	0	0	0	1.8
>110-112.5	0	4.5	4.3	1.2	2.2	3.2	0	0	0	1.8	0	0	0	0	0	1.6
>112.5-115	0	6.1	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	1.0
>115-117.5	0	0	2.1	0	2.2	0	0	0	0	0	0	0	0	0	0	.4
>117.5-120	4.2	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	.3
>120	8.3	1.5	1.1	0	0	0	0	0	2.9	0	0	0	0	0	0	.7
Total Plates in Range	24	66	94	80	46	31	39	43	35	56	68	39	36	8	6	670

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 30: The Percent of Analyst A's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	1.1	0	0	0	0	0	0	0	0	0	0	0	.2
>80-85	3.2	1.2	0	0	0	0	0	0	0	0	0	0	.7
>85-90	5.3	1.2	4.3	0	0	0	0	0	0	0	0	0	1.4
>90-95	16.0	11.2	4.3	12.9	12.8	2.3	2.9	1.8	2.9	0	0	12.5	7.1
>95-100	32.9	42.6	30.5	42.0	43.5	41.9	34.3	36.4	25.0	10.3	16.7	37.5	32.9
>100-105	18.1	31.2	43.5	35.5	38.4	44.2	51.4	54.5	52.9	53.8	58.4	50.0	41.3
>105-110	13.8	12.5	15.2	9.7	5.1	9.3	8.6	7.3	16.2	30.8	25.0	0	3.6
>110-115	6.4	0	0	0	0	2.3	2.9	0	2.9	2.6	0	0	1.9
>115-120	3.2	0	2.2	0	0	0	0	0	0	2.6	0	0	.9
>120	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Plates in Range	94	80	46	31	39	43	35	55	68	39	36	8	574
>95-105	51.1	73.7	73.9	77.4	82.1	86.0	85.7	90.9	77.9	64.1	75.0	87.5	74.2
>90-110	80.9	97.5	93.5	100.0	100.0	97.7	97.1	100.0	97.1	94.9	100.0	100.0	94.9

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 31: The Percent of Analyst B's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	6.4	1.2	2.2	3.2	0	0	0	0	0	0	0	0	1.6
>80-85	3.2	0	0	0	0	0	0	0	0	0	0	0	.5
>85-90	8.5	3.7	8.7	0	2.6	4.7	8.6	1.8	0	0	0	0	3.8
>90-95	22.3	16.2	10.9	25.8	17.9	30.2	17.1	18.2	7.4	2.6	8.3	0	16.0
>95-100	17.0	33.7	37.0	38.8	53.8	23.3	28.6	36.4	30.8	41.0	33.3	37.5	32.3
>100-105	21.3	26.2	23.9	16.2	15.4	32.6	27.7	23.7	35.3	23.1	19.5	25.0	24.5
>105-110	14.9	16.2	13.0	16.1	10.3	7.0	5.7	10.9	14.7	25.6	19.4	12.5	14.1
>110-115	5.3	1.2	2.2	0	0	0	8.6	9.1	8.8	5.1	16.7	0	5.1
>115-120	0	0	2.2	0	0	2.3	5.7	0	0	0	0	12.5	.9
>120	1.1	1.2	0	0	0	0	0	0	2.9	2.6	2.8	12.5	1.2
Total Plates in Range	94	80	46	31	39	43	35	55	68	39	36	8	574
>95-105	38.3	60.0	60.9	54.8	69.2	55.8	54.3	60.0	66.2	64.1	52.8	62.5	56.8
>90-110	65.5	92.5	84.8	96.8	97.4	93.0	77.1	89.1	88.2	92.3	80.6	75.0	86.9

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 32: The Percent of Analyst C's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	2.1	0	0	0	0	0	2.9	0	0	0	0	0	.5
>80-85	3.2	1.2	0	0	0	0	0	0	0	0	0	0	.7
>85-90	2.1	2.5	0	0	0	0	0	0	0	0	0	12.5	.9
>90-95	10.6	7.5	8.7	3.2	5.1	9.3	11.4	5.5	7.4	7.7	11.1	12.5	8.2
>95-100	20.2	27.4	15.2	29.1	10.3	16.3	14.3	34.6	42.7	43.6	44.5	25	27.1
>100-105	22.3	30.0	34.8	25.8	48.7	41.8	40.0	47.3	32.4	35.9	36.1	37.5	34.5
>105-110	19.1	20.0	15.2	32.3	28.2	25.6	22.9	9.1	13.2	7.7	2.8	0	17.2
>110-115	12.8	10.0	13.0	3.2	5.1	4.7	5.7	3.6	4.4	5.1	5.6	12.5	7.5
>115-120	5.3	1.2	8.7	0	2.6	2.3	2.9	0	0	0	0	0	2.3
>120	2.1	0	4.3	6.5	0	0	0	0	0	0	0	0	1.0
Total Plates in Range	94	80	46	31	39	43	35	55	68	39	36	8	574
>95-105	42.6	57.5	50.0	54.8	59.0	58.1	54.3	81.8	75.0	79.5	80.6	62.5	61.7
>90-110	72.3	85.0	73.9	90.3	92.3	93.0	88.6	96.4	95.6	94.9	94.4	75.0	87.1

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 33: The Percent of Analyst D's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent [1] Accuracy	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	3.2	2.5	4.3	6.5	0	0	2.9	0	2.9	0	2.8	0	2.3
>80-85	10.6	6.3	4.3	0	2.6	4.7	0	1.8	7.4	2.6	5.6	12.5	5.2
>85-90	8.5	15.0	19.6	9.7	5.1	7.0	17.1	7.3	5.9	5.1	0	37.5	9.8
>90-95	22.3	12.5	34.8	25.8	15.4	16.3	11.4	10.9	19.1	23.1	16.1	0	18.5
>95-100	22.3	27.5	13.0	25.8	28.2	18.6	14.3	14.5	11.7	23.1	30.6	25.0	20.7
>100-105	11.7	17.5	21.8	19.3	28.2	30.2	25.7	34.6	25.0	38.4	25.0	25.0	23.7
>105-110	10.6	15.0	2.2	3.2	17.9	18.6	17.1	21.8	20.6	7.7	19.4	0	14.1
>110-115	8.5	2.5	0	6.5	2.6	2.3	8.6	7.3	4.4	0	0	0	4.2
>115-120	1.1	0	0	3.2	0	0	0	0	1.5	0	0	0	.5
>120	1.1	1.2	0	0	0	2.3	2.9	1.8	1.5	0	0	0	1.0
Total Plates in Range	94	80	46	31	39	43	35	55	68	39	36	8	574
>95-105	34.0	45.0	34.8	45.2	56.4	48.8	40.0	49.1	36.8	61.5	55.6	50.0	44.4
>90-110	67.0	72.5	71.7	74.2	89.7	83.7	68.6	81.8	76.5	92.3	91.7	50.0	77.0

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 34: The Percent of Analyst E's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	0	0	0	0	0	0	0	0	0	2.6	0	0	.2
>80-85	1.1	1.2	2.2	0	0	0	0	0	0	0	0	0	.5
>85-90	2.1	0	0	0	0	0	0	0	0	0	0	0	.3
>90-95	10.6	6.3	8.7	9.7	2.6	11.6	0	10.9	2.9	10.3	5.6	0	7.3
>95-100	27.7	26.3	23.9	35.5	46.1	44.2	45.7	50.9	51.5	48.7	55.6	37.5	39.6
>100-105	24.5	40.0	43.5	38.7	43.6	34.9	42.9	32.7	42.7	30.7	36.1	50.0	36.6
>105-110	22.3	18.8	17.4	12.9	7.7	9.3	8.6	5.5	1.5	7.7	2.8	12.5	11.7
>110-115	9.6	6.3	2.2	3.2	0	0	2.9	0	1.5	0	0	0	3.1
>115-120	2.1	1.2	2.2	0	0	0	0	0	0	0	0	0	.7
>120	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Plates in Range	94	80	46	31	39	43	35	55	68	39	36	8	574
>95-105	52.1	66.2	67.4	74.2	89.7	79.1	88.6	83.6	94.1	79.5	91.7	87.5	76.1
>90-110	85.1	91.2	93.5	96.8	100.0	100.0	97.1	100.0	98.5	97.4	100.0	100.0	95.1

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 35: The Percent of Analyst F's Counts in each Count Range grouped by Percent Accuracy based on the Mean Count, Highlighting the 95 to 105 and the 90 to 110% Accuracy Ranges

Percent Accuracy [1]	COUNT RANGE 10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400	ROW TOTAL
<80	0	2.5	0	0	0	0	0	0	0	2.6	0	0	.5
>80-85	0	0	2.2	0	0	0	5.7	0	1.5	0	0	0	.7
>85-90	3.2	0	4.3	0	0	0	0	3.6	5.9	7.7	2.8	0	2.6
>90-95	10.6	8.8	8.7	6.5	5.1	9.3	11.4	16.4	29.4	28.2	25.0	37.5	14.8
>95-100	26.6	51.2	28.2	45.2	64.1	46.6	68.6	58.2	52.6	43.5	55.5	25.0	45.6
>100-105	33.0	27.4	47.9	41.9	30.8	34.9	11.5	20.0	19.1	10.3	16.7	25.0	27.0
>105-110	16.0	7.5	4.3	3.2	0	9.3	0	0	1.5	7.7	0	12.5	5.7
>110-115	6.4	2.5	2.2	3.2	0	0	0	1.8	0	0	0	0	1.9
>115-120	3.2	0	2.2	0	0	0	0	0	0	0	0	0	.7
>120	1.1	0	0	0	0	0	2.9	0	0	0	0	0	.3
Total Plates in Range	94	80	46	31	39	43	35	55	68	39	36	8	574
>95-105	59.6	78.6	76.1	87.1	94.9	81.5	80.0	78.2	61.8	53.8	72.2	50.0	72.6
>90-110	86.2	95.0	89.1	96.8	100.0	100.0	91.4	94.5	92.6	89.7	97.2	100.0	93.2

[1] Analyst count/mean count for the corresponding plate times 100.

TABLE 36: Analysis of Variance of the Percent Absolute Deviation of Analyst Count from the Mean Count for all Analysts and Count Ranges from 10 to <400

Source	SS	df	MS	F	Significant .05
Between Plates	2.6926	573			
Count Ranges	0.3609	11	0.0328	7.9085	Yes
Plates w/Count Ranges	2.3317	562	0.0041		
Within Plates	5.5004	2870			
Analyst	0.3800	5	0.087	43.2324	Yes
Analyst x Count Ranges	0.1804	55	0.0033	1.8653	Yes
Analyst x Plates w/Count Ranges	4.9400	2810			
TOTAL	8.1931	3443			

TABLE 37: Percent of Analysts' Counts within 5% of the Mean Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	70	81	81	82
B	53	59	60	59
C	52	59	62	65
D	42	45	46	48
E	68	78	82	85
F	76	82	79	77
Mean	60[a]	67[b]	68[b]	69[b]

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 38: Percent of Analysts' Counts within 10% of the Mean Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	93	98	98	99
B	88	90	89	89
C	82	88	90	92
D	75	77	78	78
E	93	97	98	99
F	93	95	94	96
Mean	87[a]	91[b]	91[b]	92[b]

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 39: Ninety-five Percent of Analysts' Counts were Within a Certain Percentage of the Mean Count

	COUNT RANGE											
Analyst	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400
A	15	9	10	6	7	7	6	5	8	10	6	6
B	21	12	15	9	8	13	13	11	13	10	15	38
C	19	14	18	11	11	10	12	9	9	9	9	12
D	19	18	19	17	11	16	14	12	19	10	16	15
E	13	11	14	8	6	6	8	6	5	8	5	6
F	14	10	12	6	5	7	15	10	12	11	7	9
Mean	17	12	15	10	8	10	11	10	11	10	10	14

TABLE 40: Ninety-five Percent of Analysts' Counts were Within a Certain Percentage of the Mean Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	10	7	7	7
B	14	12	12	13
C	15	12	11	11
D	17	16	15	15
E	10	9	8	7
F	9	9	9	9
Mean	13[a]	11[b]	10[b]	10[b]

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

TABLE 41: Ninety Percent of Analysts' Counts were Within a Certain Percentage of the Mean Count

	COUNT RANGE											
Analyst	10-<20	20-<30	30-<40	40-<60	60-<80	80-<100	100-<150	150-<200	200-<250	250-<300	300-<350	350-<400
A	13	7	8	6	7	6	6	5	6	8	6	5
B	18	9	12	9	8	10	11	9	11	8	13	17
C	16	10	16	9	9	9	10	6	8	6	7	10
D	17	16	14	14	10	13	14	11	17	8	10	13
E	11	9	10	7	5	6	5	6	5	7	5	4
F	13	7	8	5	4	6	7	8	8	9	7	9
Mean	15	10	11	8	7	8	9	7	9	8	8	10

TABLE 42: Ninety Percent of Analysts' Counts were Within a Certain Percentage of the Mean Count by Count Range Group*

	COUNT RANGE GROUP			
Analyst	10-100	20-200	30-300	40-400
A	9	6	6	6
B	12	10	10	10
C	12	10	9	8
D	14	13	13	12
E	9	7	6	6
F	8	7	7	7
Mean	11[a]	9[b]	9[bc]	8[c]

* Percentages have been adjusted to reflect normal distribution of counts in different count range groups.

For each Count Range Group, mean values followed by the same letter are not significantly different at the 5% level of significance.

Figure 1. Photograph of agar plate prior to counting

Figure 2. Photograph of agar plate with colonies marked

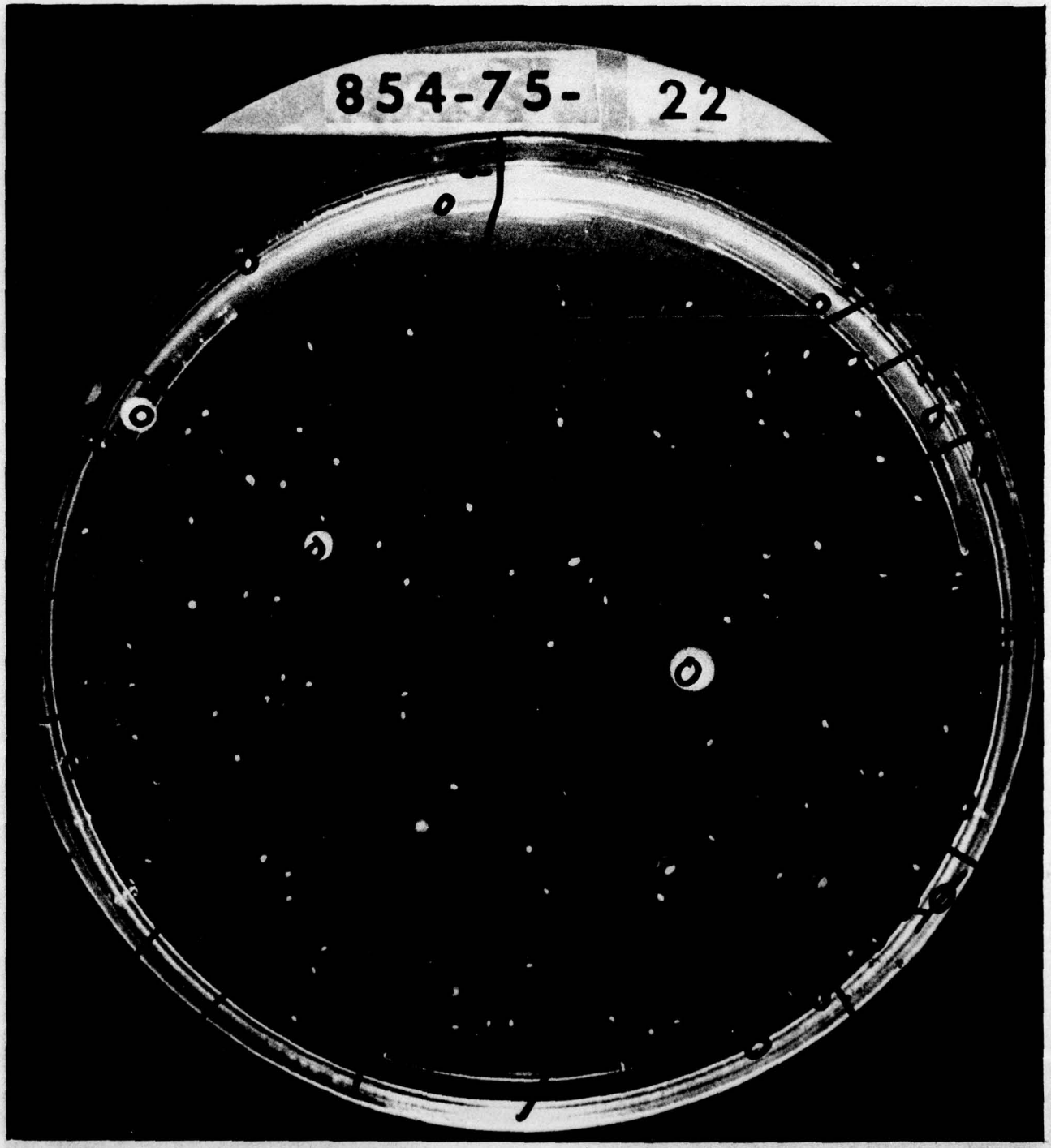

Figure 3. Photograph of agar plate after colonies were marked, partitioned, counted, verified and recorded

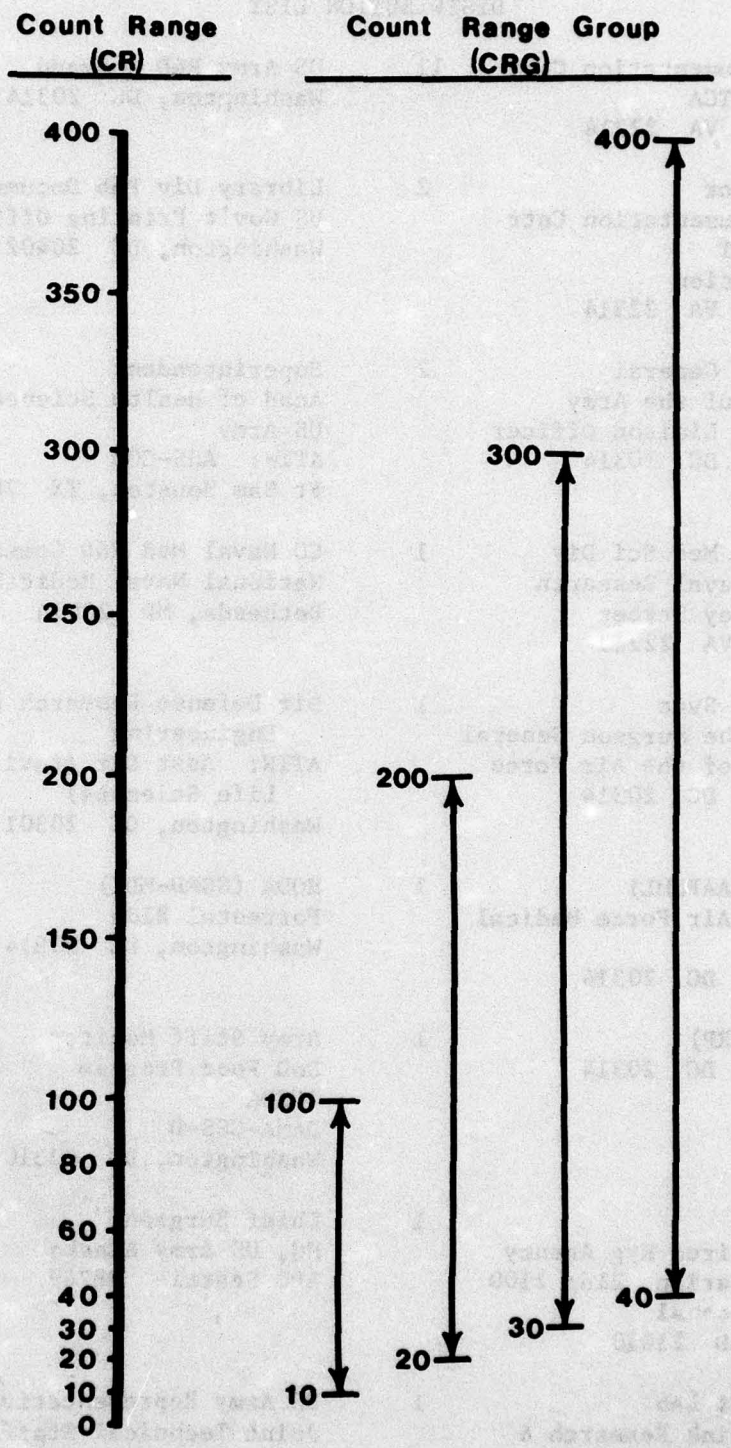

Figure 4. Relationship of count ranges to count range groups.

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